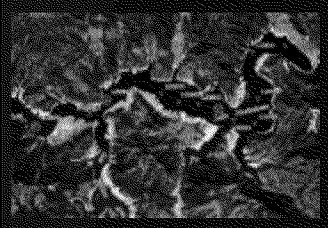
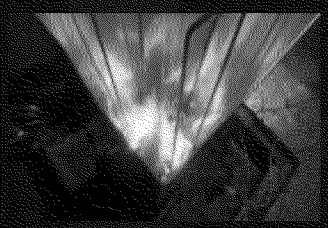
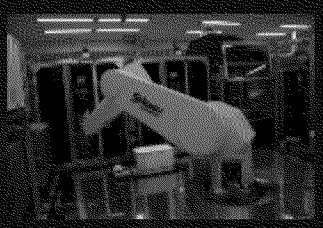
U.S. EPA Office of Research and Development and Environmental Council of the States

Partners for Meeting State Research Needs

Florida and Louisiana

September 2017




U.S. EPA's Office of Research and Development and Environmental Council of the States

Partners for Meeting State Research Needs

The success of environmental protection and public health in the United States begins on the front lines at the state and local levels. EPA's Office of Research and Development (EPA ORD) is a vital scientific and technical resource to states and their communities, providing the technical support and training, science-based tools, and innovative approaches and methods they need to meet their highest priority environmental and related public health challenges, while also laying the groundwork for long-term health and prosperity.

Collaboration and teamwork with state environmental agencies make that all possible. EPA ORD has developed critical partnerships to ensure our work is relevant to real-world environmental challenges and that scientific findings and tools are delivered to decision makers in ways that make them immediately accessible and useful. EPA ORD has partnered with the Environmental Council of the States (ECOS, the national association of state environmental agency leaders) and its research arm, the Environmental Research Institute of the States (ERIS), to ensure that our research is useful and practical for states to help address their on-the-ground problems.

Our state partners provide significant insights into the environmental problems they face and how EPA can best translate ORD science into well-informed decision tools for states and communities. Over the past six years, ERIS and EPA ORD have strengthened the alignment of EPA's scientific and technical capabilities with state research priorities and needs through a series of meetings and state surveys. As a result of this effort, EPA ORD better understands the science needs of state environmental agencies, and states better understand EPA ORD's research, tools and role within EPA. As recently as 2016, states identified their needs and grouped them into broad topics, such as water, emerging contaminants/toxics, waste/remediation and air/ozone. EPA ORD values the information the ERIS survey provides, as it will help us to continue to align our research program with state science needs.

This document compiles summaries of how EPA ORD's work during the past five years, in partnership with state agencies, counties, communities and universities, has supported states in their efforts to protect human health and the environment. These stories highlight a wide range of research, development, decision support tools and technical assistance efforts focusing on air and water pollution, chemicals, Superfund and other contaminated site remediation, infrastructure and homeland security – all of which are vitally important to helping states address the highest priority, on the ground problems.

We look forward to continuing to build our partnership with ERIS to develop the science that meets states' immediate and long-term needs.

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Partners: Florida Department of Environmental Protection (DEP), South Florida Water Management District (SFWMD)
Challenge: Saltwater encroachment damaging freshwater vegetation communities in the floodplain (ongoing)
Resource: Time series salinity model as a tool for development and evaluation of restoration alternatives

"The salinity tool will allow the ecological sub-team of the Loxahatchee River Watershed Restoration Project to evaluate the various potential project features in order to determine what grouping of features such as storage reservoirs, storm water treatment facilities, and restored wetlands performs the best for the restoration of flows to the federally designated Northwest Fork of the Loxahatchee River. The tool allows us to take the differing flow scenarios from the watershed and predict how those flows will change the salinity regimes in the river and therefore affect the location, health and survival of key indicator species such as juvenile fish, submerged aquatic vegetation and oysters." – SFWMD Applied Science Bureau, Coastal Ecosystems Section Science Supervisor Patti Gorman

Loxahatchee River contains a diverse array of aquatic and riparian ecosystems, with the upper reach being home to one of the last remnants of bald cypress (*Taxodium distichum*) floodplain swamp in southeast Florida. In 1985, a 16.6-km stretch of the river became Florida's first federally-designated National Wild and Scenic River. The unique ecosystem of the Loxahatchee River, with its quiet beauty, has captured the attention and imagination of residents and visitors, as well as agency and community leaders for many years. However, anthropogenic alterations of the Loxahatchee River watershed, particularly the permanent opening of the Jupiter Inlet and construction of drainage canals, have resulted in significant encroachment of a saltwater-tolerant, mangrove-dominated community into the freshwater floodplain currently dominated by bald cypress. Restoration of the ecosystem has become a priority for federal, state and local agencies and the general public.

Essential to the restoration of the Loxahatchee River ecosystem are technically sound modeling tools for the development and screening of restoration alternatives. EPA ORD scientists developed a salinity modeling tool implemented in a user-friendly Excel© platform. Salinity can be simulated with a given time series of freshwater inflow associated with varying restoration alternatives developed during the planning process. Spatial features of the tool also allow for estimation of salinities at any designated locations along the entire reach of the river. The simulated salinity data are further used to quantify the ecological benefits with respect to habit lifts of freshwater floodplain vegetation, fish larvae, oysters and seagrasses in response to these varying restoration alternatives. Stakeholders from the SFWMD and Florida DEP are using this tool in the development of restoration alternatives, while EPA ORD scientists continue to provide technical support for model development and application.

Partners: Florida Department of Environmental Protection (DEP), Escambia County
Challenge: Nitrogen pollution in urban environments (ongoing)
Resource: Isotopes as tracers to identify sources of nitrogen pollution

"Our partnership with EPA ORD offers us a wonderful opportunity to gain a better understanding of nutrient loads and likely sources within the Bayou Chico and Pensacola Bay watersheds. Funding for environmental restoration is always limited. Having this understanding allows Escambia County and our partners to prioritize projects that have the greatest potential to have a positive impact on our ability to attain our surface water quality goals. We hope to use this research in the future as the basis for better resource management decisions." – Escambia County, Water Quality and Land Management Division Manager Brent Wipf

Bayou Chico is part of the Pensacola Bay System in northwest Florida and the subject of a basin management action plan by the Florida DEP to improve water quality through reductions in nitrogen loadings. Moreover, local governments are investing heavily to restore Bayou Chico and spur economic development in the surrounding area. Two creeks in the watershed provide an ideal urban setting to compare nitrogen loadings between contrasting land use and land coverages. Jackson Creek traverses residential and business developments and is listed as impaired for elevated fecal coliforms and nitrogen levels. Jones Creek originates in a reclaimed nature preserve/greenway and rarely exceeds water quality standards for fecal coliforms and nitrogen.

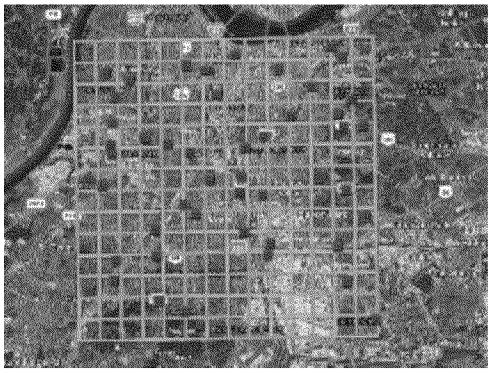
EPA ORD scientists in collaboration with Region 4 (Southeast) and partners are collecting water and sediment samples in the creeks and watershed to compare and contrast potential sources, fate and transport of nitrogen in the two creeks. Sampling locations are located along the creeks, the bayou, adjoining lakes and wells for groundwater sampling. Samples are collected on a quarterly basis for base flow measurements and more frequently around rainfall events. Samples are analyzed for a suite of water quality chemical parameters including nitrite, nitrate and chemical tracers of wastewater discharge. Elemental isotope ($\delta^{15}N$ and $\delta^{15}O$) data will be analyzed using mixing models in conjunction with water quality data to provide estimates of N loading and turnover in the two creeks and their contribution to the bayou. This project is providing the technical basis for the County and Florida DEP to better understand nutrient loads and sources in the watershed and inform decision making for the basin wide management action plan.

Partner: Louisiana Department of Environmental Quality (DEQ) and LaPlace, LA
Challenge: Potential cancer risks from emissions of chloroprene (ongoing)
Resource: IRIS assessment and air quality monitoring

"I want to thank EPA's Office of Research and Development for their assistance in gathering and interpreting air quality data from around the Denka Performance Elastomer facility in LaPlace, LA. The information ORD provided helped the Louisiana DEQ design and implement actions to reduce chloroprene emissions from the plant. The multi-step Denka remedy is in the first stages of its implementation and has already produced significant reductions in chloroprene emissions. When agencies work together, everyone benefits." – Louisiana DEQ Secretary Dr. Chuck Carr Brown

EPA ORD scientists assisted Region 6 (South Central U.S.) and the state of Louisiana with their evaluation of potential cancer risks from emissions of chloroprene from the Denka Performance Elastomer facility in LaPlace. Based on the risk evaluation and an engineering analyses, the company reached an agreement with Louisiana to install control equipment to significantly reduce chloroprene emissions. The facility had been identified in the EPA's National Air Toxics Assessment (December 2015) as the highest cancer risk facility in the U.S., leading to ambient air monitoring in the vicinity of the facility. The air monitoring demonstrated high levels of chloroprene in the ambient air in the surrounding neighborhood and at schools near the facility. ORD scientists and staff from the Louisiana DEQ, EPA's Region 6 and Office of Air and Radiation met with the community at a public meeting in LaPlace. EPA researchers characterized the potential health risks associated with chloroprene. The company initially questioned the science basis of EPA's Integrated Risk Information System (IRIS) assessment, but following additional communication the company has not pursued further challenges to the IRIS assessment. EPA directly supported the state of Louisiana in achieving action to reduce public health risks from the chloroprene emissions.

Partners: Florida Department of Environmental Protection, Georgia Environmental Protection Division, Kentucky Department of Environmental Protection, North Carolina Department of Environmental Quality, South Carolina Department of Health and Environmental Control and Tennessee Department of Environment and Conservation
Challenge: Characterizing urban background levels for contaminated site cleanup levels (ongoing)
Resource: Sampling protocol



"Having a data set like the one gathered during the urban background study is invaluable. It is very helpful to now have a comprehensive data set that we can use to make scientific determinations regarding appropriate urban background concentrations for many constituents."– Tennessee Department of Environment and Conservation Environmental Consultant Merrie Embry, in the Memphis Environmental Field Office, who also noted that the benefit of working with EPA ORD and the other Southeastern states has helped to ensure consistency in their sampling approach and data evaluation.

In 2015, EPA scientists partnered with several Region 4 (Southeast) states to figure out how urban background contaminants differ from industrial waste at urban sites. Initial efforts were focused on creating a process for both soil sample collection and analysis that could be consistently applied across southeastern cities.

Soil samples collected from Louisville, KY; Lexington, KY; Memphis, TN; Raleigh, NC; and Winston-Salem, NC, were analyzed in EPA laboratories and added to a growing urban background database for metals and PAHs. The data and sampling process can be used by EPA, state agencies and local authorities to assess hazardous waste and brownfield sites and make decisions around cleanup. The database will provide a general range of urban background contaminant levels to be expected from sites in Region 4 cities. It can also serve as a screening tool for comparison of potential sites. The utility of the tool is improved as coverage of data for comparison over broader areas increases and more urban background data are added.

The success of the project has allowed sampling efforts to expand to additional cities in Tennessee, Georgia and Florida. Recently, EPA and the state of Tennessee have used the study protocol to conduct an urban background sampling effort in Chattanooga, TN. Additional regions, states and universities, including Georgia State University in Atlanta, have expressed interest in the results and established sampling process. Professors and students at the University of Florida in Gainesville have already used the sampling process in two urban areas in central Florida.

Partner: Colorado, Florida, Kentucky, Michigan, New York and Ohio
Challenge: Simulating and monitoring conditions in drinking water utilities (ongoing)
Resources: Technical assistance and field support

"Having access to my operational data in real-time keeps me on top of the system performance even when I am not at the plant. This tool helps me manage my staff and resources by providing greater flexibility and real-time information." – Milford, OH Water Department Supervisor Matt Newman

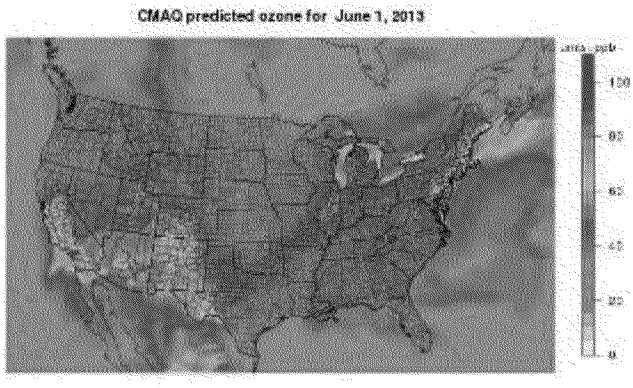
EPANET-RTX (real-time extension) and RTX:LINK are software tools that have helped states and their drinking water utilities by allowing continuous monitoring of their operations to improve water quality and respond to incidents. Together states and their utility partners use the tools to better understand and help improve drinking water system operations.

EPANET-RTX was developed to allow utilities to link their raw Supervisory Control and Data Acquisition (SCADA) data with the EPANET distribution system hydraulic model to evaluate conditions in the system in real time. The development of real-time analytics can provide utilities with the necessary tools to enhance system operations including emergency response, improved pressure management, leak detection and water quality. EPANET-RTX is currently in use in many locations including Ohio, Colorado, Florida, Kentucky, Michigan and New York.

To make real-time monitoring available to small systems that lack powerful computing capability, RTX:LINK provides access to the SCADA data through mobile applications and desktop computers. RTX:LINK software provides simple and secure access to key water utility operational data streams, using web-based dashboards for trending and alerting. With RTX:LINK drinking water utilities have the ability to better understand water quality and operational conditions in their system at any point in time.

RTX:LINK software is easy to install on popular SCADA systems and has been tested in several locations. RTX:LINK has been piloted in the Milford, Ohio, water system, where it has provided 24 hour access to current and historical tank levels, pump statuses and distribution system flows via mobile or desktop devices. RTX:LINK is also being tested in the city of Flint, Michigan, where it is being used to provide the same benefits as those in Milford along with a continuous, real-time understanding of water age. Using this technology has helped these water systems optimize operation, identify water losses or low pressure areas, and help predict available pressure for firefighting should any disruption occur in the distribution system.

Partner: Maryland Department of Environment (MDE) and other state air agencies
Challenge: Need for effective strategies to reduce harmful air pollutants (ongoing)
Resource: EPA's Community Multiscale Air Quality (CMAQ) Modeling System



"Maryland has made dramatic progress over the past 10 years in reducing ozone and fine particle pollution. We have invested heavily into research and modeling and this investment has been one of the reasons we have been successful. The CMAQ photochemical model has been the key tool we have used to design and refine control strategies. It has helped us find least cost solutions to reduce ozone and fine particle pollution." – MDE Secretary Ben Grumbles

For more than 15 years, EPA and states have been using EPA's Community Multiscale Air Quality (CMAQ) Modeling System, a powerful computational tool for air quality management. CMAQ simultaneously models multiple air pollutants, including ozone, particulate matter and a variety of air toxics to help air quality managers determine the best air quality management scenarios for their states and communities.

State agencies that control air pollution use CMAQ to develop and assess implementation actions needed to attain National Ambient Air Quality Standards (NAAQS) mandated by the Clean Air Act. States use the tool to identify sources of air quality problems and to assist in the design of effective strategies to reduce harmful air pollutants. Using data about land use, meteorology and emissions, CMAQ provides detailed information about the concentrations of air pollutants in a given area for any specified emissions or air quality scenario. With information generated by CMAQ, states are able to examine the estimated impacts of different air quality policies.

The National Weather Service also uses the model to produce air quality forecasts twice daily, and the Centers for Disease Control and Prevention uses CMAQ data in two community-focused tools that allow users to access county-specific air quality information on pollutants, such as ozone and particulate matter.

CMAQ has a worldwide user community with users in 125 countries. The system brings together three kinds of models including: meteorological models to represent atmospheric and weather activities; emission models to represent man-made and naturally-occurring contributions to the atmosphere; and an air chemistry-transport model to predict the atmospheric fate of air pollutants under varying conditions. The newest version of the model (CMAQ 5.2) is expected to be released in June 2017.

Partner: Interstate Technology and Regulatory Council (ITRC)
Challenge: Need for specialized risk assessment training (completed)
Resource: Training module, *Decision Making at Contaminated Sites: Issues and Options in Human Health Risk Assessment*

"The experience and knowledge of EPA scientists were essential to the success of this important training used by state risk assessors and others to address complex challenges at contaminated sites." – California Department of Toxic Substances Control (State Co-Chair) Claudio Sorrentino

"The ITRC risk training is more robust as a result of our partnership with EPA experts on this effort." – South Dakota Department of Environment and Natural Resources (State Co-Chair) John McVey

EPA ORD partnered with ITRC, a program of the Environmental Research Institute of the States, to develop specialized training for state risk assessors responsible for the cleanup of chemicals released into the environment. Based on feedback from EPA's Risk Assessment and Training Experience (RATE) program, ORD scientists reached out to ITRC and proposed that ITRC create training modules on the harmonization of risk assessment approaches across state regulators. EPA experts provided materials developed for its RATE program for the ITRC effort. These materials provide up-to-date and comprehensive training for human health risk assessment, ranging from beginner to expert classes.

The ITRC team of approximately 75 representatives from various environmental sectors completed a comprehensive web-based training module entitled, *Decision Making at Contaminated Sites: Issues and Options in Human Health Risk Assessment*. ORD scientists provided expert technical support as needed along the development processes and extensive peer reviews before release of the final product. Currently, all interested risk assessors in the U.S. and around the globe have free access to this important training material (http://www.itrcweb.org/risk-3/). To date, more than 2,100 people have taken the online course and the associated guidance document is available to download.

Partners: Ohio Environmental Protection Agency (EPA), Association of State Drinking Water Administrators (ASDWA) and other state contributors
Challenge: Providing information, technical assistance and training to small drinking water systems (ongoing)
Resource: Webinars, workshops and workgroup to address challenges and treatment solutions for small systems

"It's very important that we provide small water systems with timely, easy to use, and accessible tools and training to assist in operating these critical public water systems, and the webinars and one-on-one meetings are perfectly suited to meet this need." – Ohio EPA Director Craig Butler

EPA ORD and Office of Water, in coordination with Ohio EPA and ASDWA, began hosting a monthly webinar series in 2015 targeted for state agencies on challenges and treatment solutions for small water systems. Because they have fewer resources than larger systems, small systems face enormous challenges in consistently providing safe and reliable drinking water. The series allows EPA to provide training and foster collaboration and dissemination of information, which, in turn, will help state agencies communicate the latest scientific advancements and current guidance to their small systems. It also serves as a forum for the invaluable flow of information, providing critical insight about the problems small water systems are currently encountering in their day-to-day interactions. With that increased awareness, ORD experts can then modify their research to solve real-world problems that small systems are experiencing.

As of July 2017, the series has attracted 24,374 participants from all 50 states, tribal nations, U.S. territories and international participants, and has provided 13,651 continuing education credit certificates (supported by Ohio EPA). Presenters include representatives from state drinking water agencies to help encourage communication between the states. For the webinar series schedule, registration and past recordings, visit EPA's website at (www.epa.gov/water-research/small-systems-monthly-webinar-series).

In addition to the webinar series, EPA hosts an annual small drinking water systems workshop in collaboration with ASDWA. This free, face-to-face workshop offers in-depth training and information for handling small drinking water systems problems and compliance challenges. It is primarily designed for state personnel responsible for drinking water regulations compliance and treatment technology permitting. The workshop typically attracts between 200-400 attendees from across the nation. This year's workshop will be held August 22-24 in Cincinnati; registration is available at (www.epa.gov/water-research). Formed during the 2011 workshop, ORD also leads a small drinking water systems technical communications workgroup to focus on targeted communication efforts between EPA and the states, taking into account the different needs system operators. In addition to EPA staff, the workgroup includes state regulatory agency and small water utility representatives from 13 states. A successful lead free communications tool has been developed, and the workgroup meets on a regular basis to decide on needed topics for the webinar series and to discuss the development of new tools.